

Chapter 11

Maxillo-mandibular Records



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Maxillo-mandibular Records

There are distinct differences between natural dentition and complete denture occlusion



- Natural teeth are are suspended in the bone by the PDL which acts as a shock absorber.
- Denture teeth are part of the denture base which rests on movable/ displaceable tissues
- Premature, deflective contacts between artificial teeth cause movement of the denture resulting in damage to the supporting tissues



Goals of Complete Denture Occlusion

- Limit trauma to the supporting structures
- Preserve remaining structures
- Enhance stability of the dentures
- Restore Esthetics, Speech and Mastication

Definition of Balanced Occlusion: is the simultaneous contacting of the maxillary and mandibular teeth in the R and L and in the anterior and posterior occlusal areas when the jaws are either in centric, lateral, or protrusive positions.



Centric relation



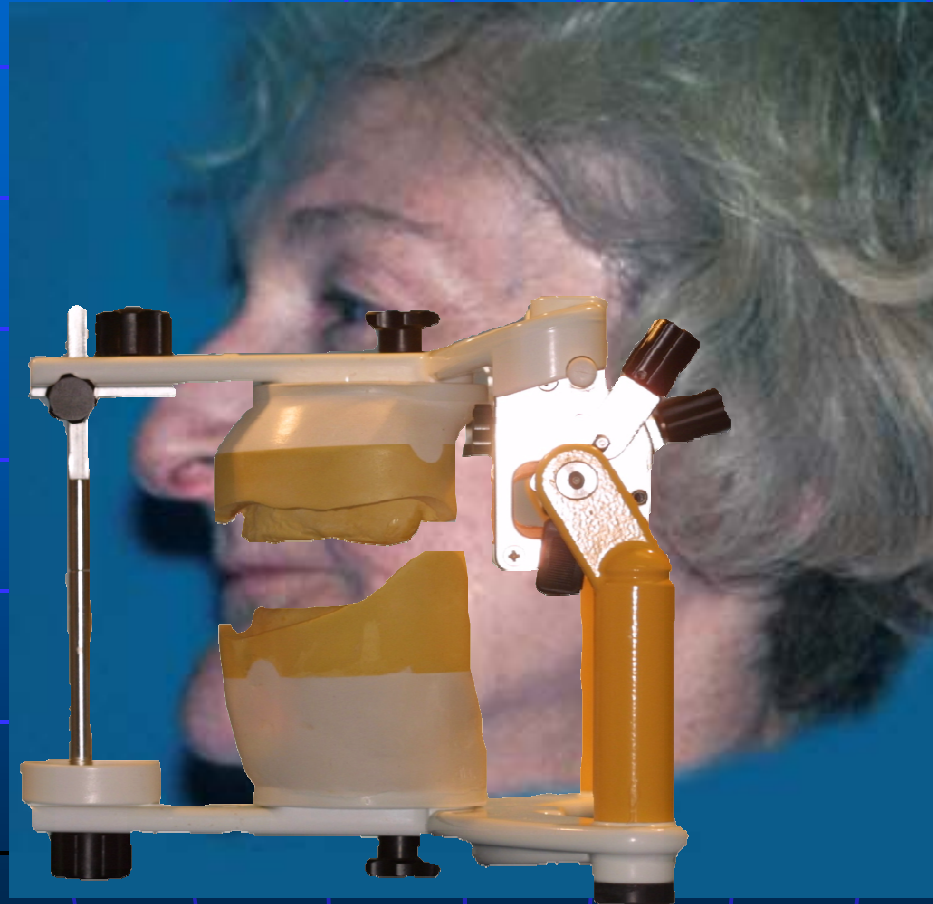
Protrusive



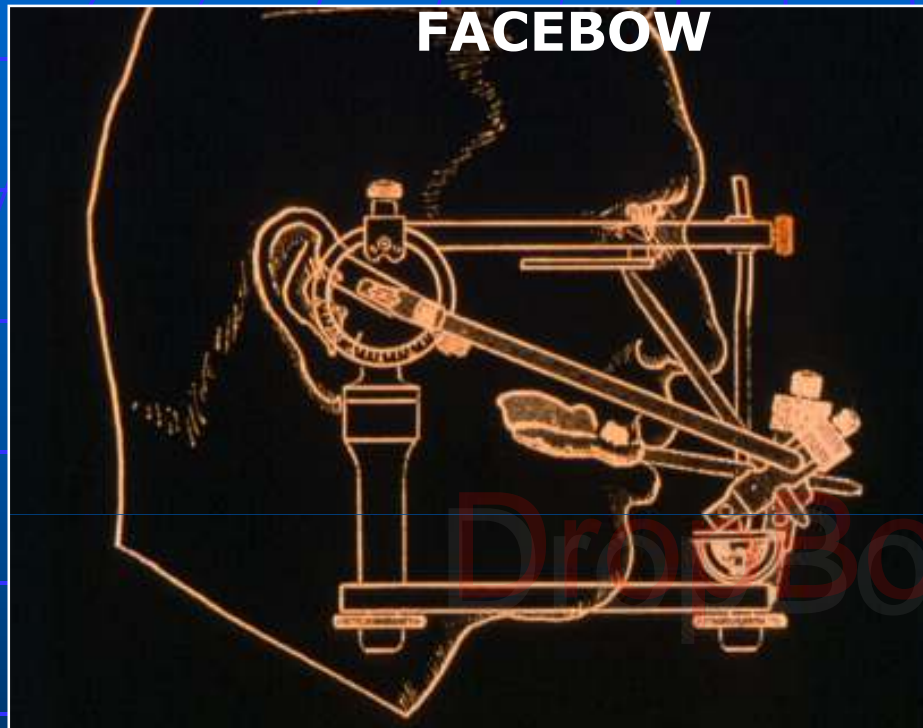
Lingualized occlusion in working



Balancing



In order to establish a balanced occlusion we must transfer our patients' maxillo-mandibular relationship to the articulator.



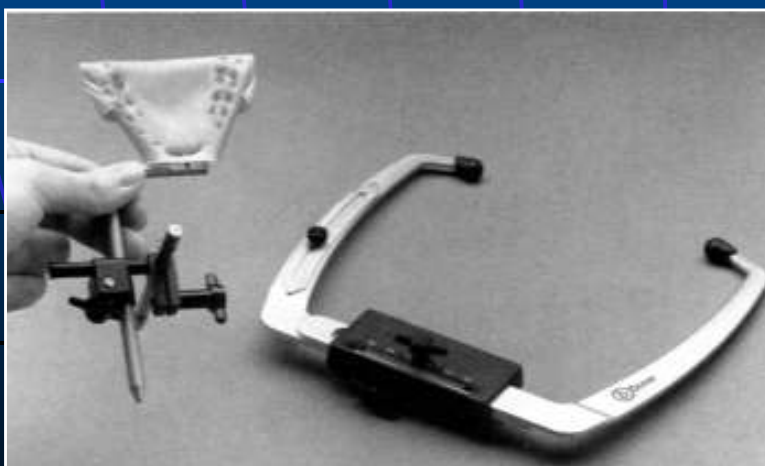
- Records the orientation of the maxilla to the terminal hinge axis.
- Provides the same relative opening axis on the articulator as the mandible has to the TMJ.

Ivoclar



Definition: orients the maxilla to the transverse axis of the mandible in three dimensions and allows the transfer of this orientation to the articulator.

Denar



Hanau





Definition of Hinge Axis: A hypothetical line through the two mandibular condyles around which the mandible may rotate.

True Hinge Axis:

- Is difficult to determine especially in edentulous patients and requires special armamentarium.



Arbitrary Hinge Axis:

- Is an estimated axis location, using any of the current techniques will place the position within $\pm 6\text{mm}$ of the true hinge axis.
- *Earbows* use the external auditory meatus reference point as the arbitrary hinge axis location.



WAX RIM CONTOUR

- Place the maxillary record base and wax rim in the patient's mouth and contour for proper phonetics, esthetics, lip support, and occlusal plane.



WAX RIM CONTOUR

Before adjustment

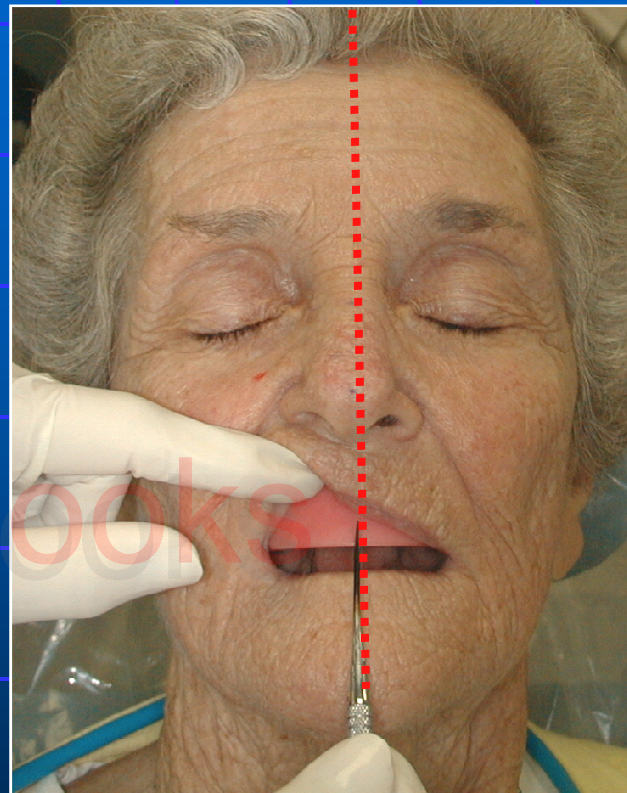
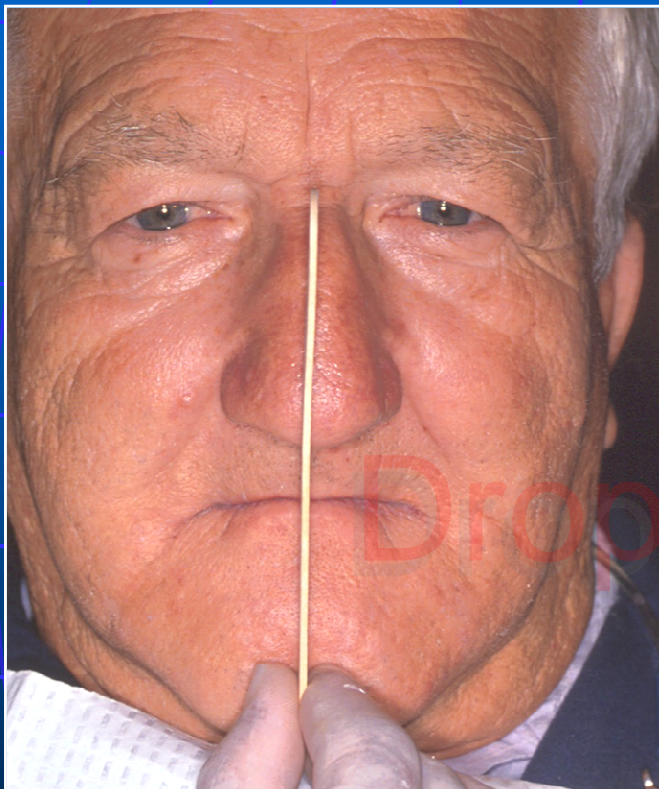


After adjustment



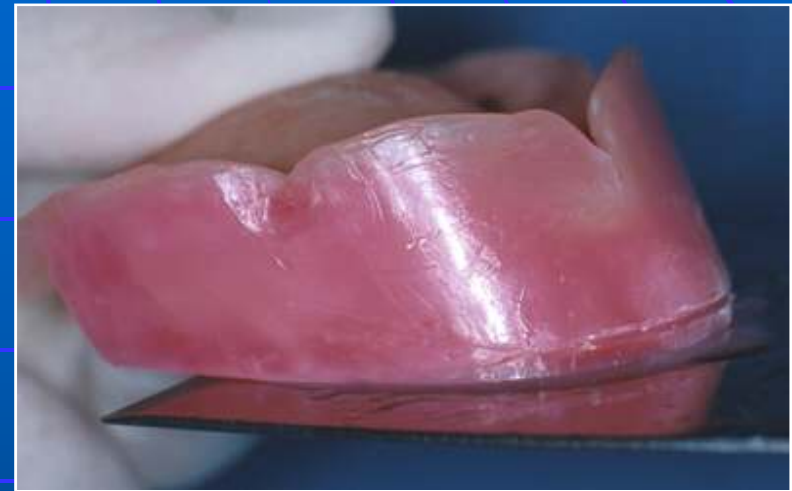
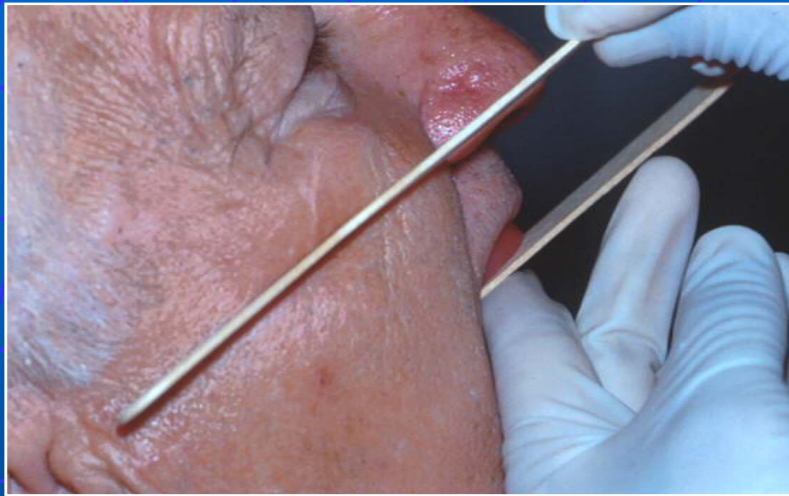
- **With the lips at rest the wax rim should project 1-2 mm below the lip line.**

WAX RIM CONTOUR

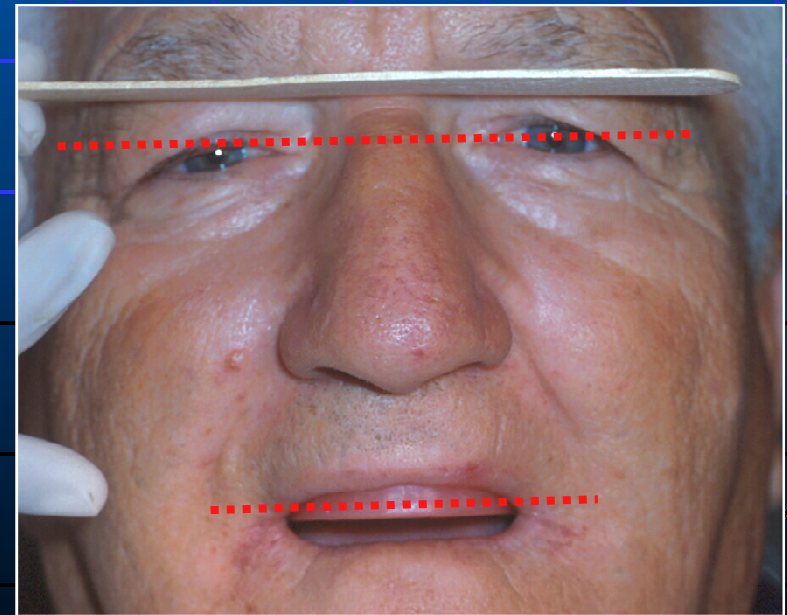


- **Mark the midline on the wax rim.**

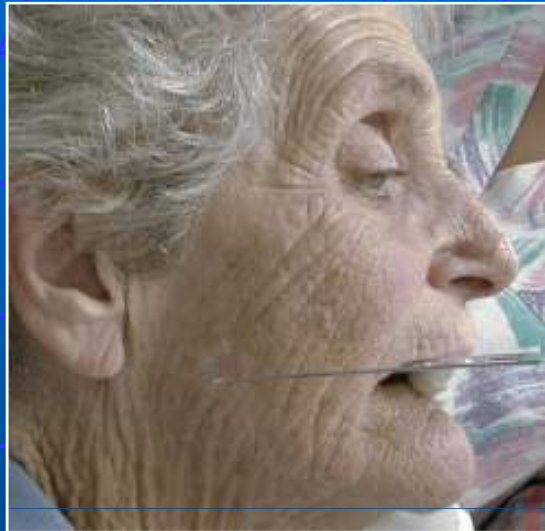
OCCLUSAL PLANE



- Adjust the plane of the wax rim so that it is parallel to Camper's plane.
- Adjust the plane of the wax rim so that it is parallel to the interpupillary line.



OCCLUSAL PLANE



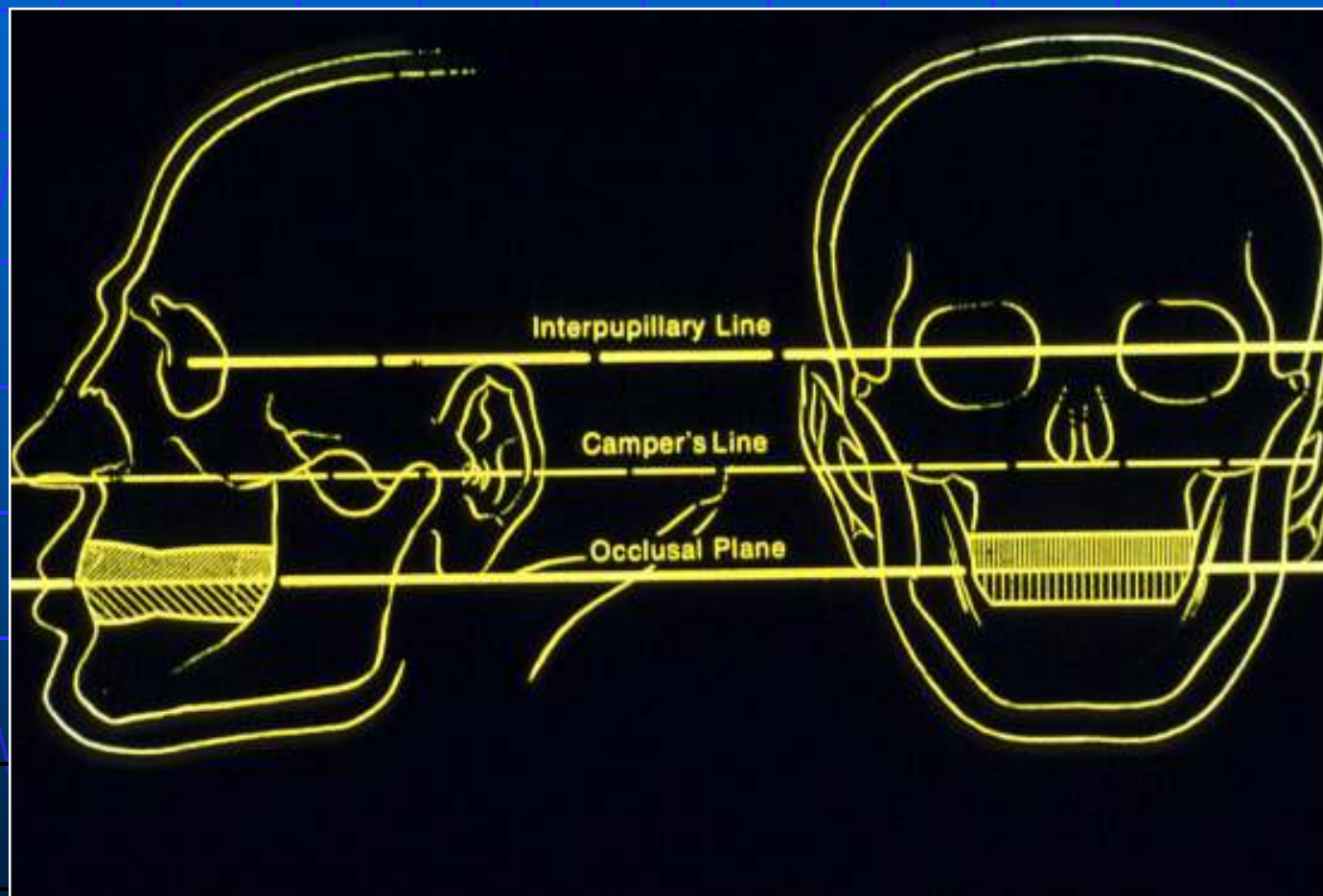
- A **Fox Plane** can be used to help properly orient the occlusal plane.



- Note the position of the occlusal plane in relation to the corners of the lips.



OCCLUSAL PLANE



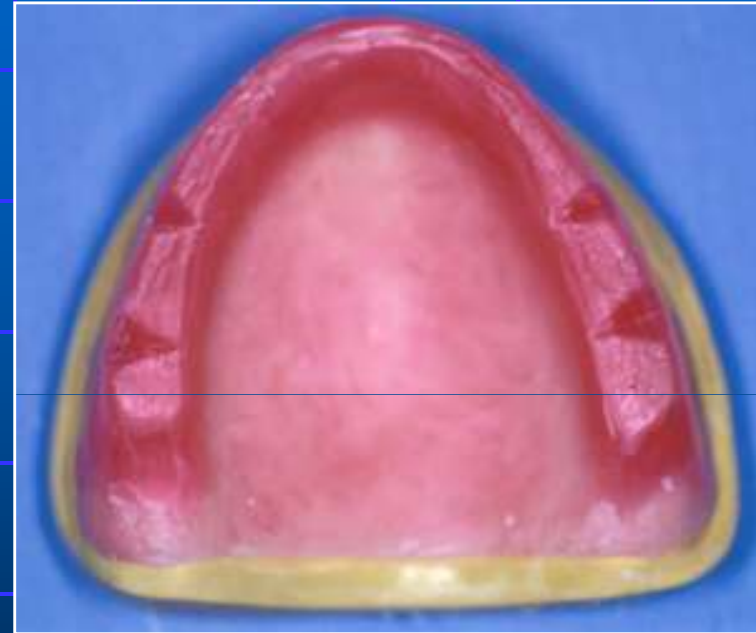
FACEBOW TRANSFER RECORD

Armamentarium

- Compound
- Water bath
- Alcohol torch
- Vaseline
- Red handled knife
- Facebow



FACEBOW TRANSFER RECORD



- **Place notches in the maxillary wax rim as shown**

FACEBOW TRANSFER RECORD

- Index wax rim to bite fork with compound as shown

Vaseline



Thin layer



Soften compound



Temper



Center midline



FACEBOW TRANSFER RECORD



- **Have the patient position the ear pieces.**
- **Place the nose piece on the bridge of the nose. This will provide support for the entire earbow apparatus.**

FACEBOW TRANSFER RECORD



- **Position the 3rd point of reference at the base of the ala.**
- **The earpieces can be adjusted up or down to level the bow parallel to the interpupillary line.**

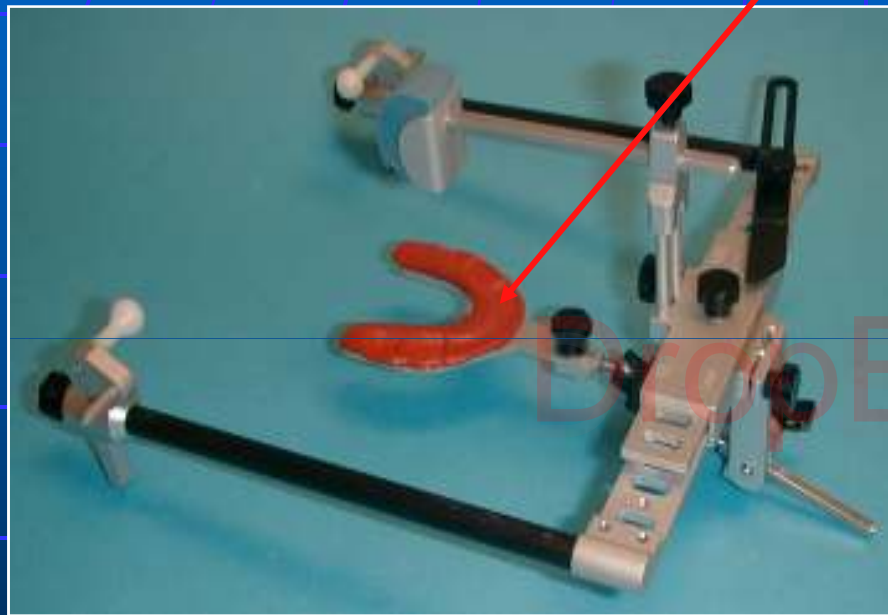
FACEBOW TRANSFER RECORD



- **The record base, wax rim and bite fork are now inserted in the patients mouth and connected to the facebow.**

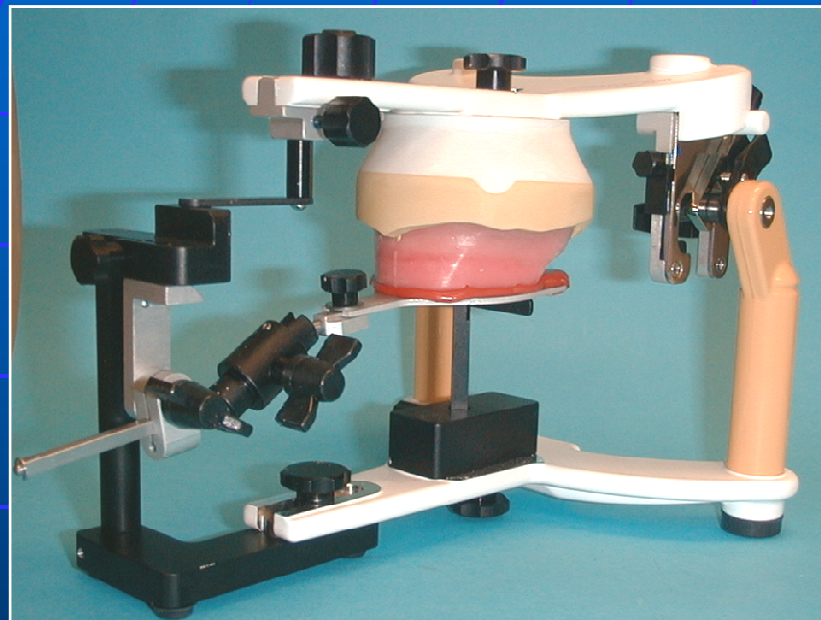
FACEBOW TRANSFER RECORD

The record on the bite fork is indexed to the maxillary wax rim



- **Remove the facebow from the patient. Insert the maxillary cast into the record on the bite fork and attach the cast and face bow to the Stratos articulator with the mounting jig.**

FACEBOW TRANSFER RECORD



Reminder: Before mounting the upper cast, make sure the incisal guide pin is at zero and in contact with the incisal guide table.



FACEBOW TRANSFER RECORD



- **The mounting is carefully smoothed and sanded.**



Vertical Dimension

- Refers to the length of the face.
- It's the distance between two selected points, one on the fixed member (nose tip) and one on the movable member (chin point).
- Is maintained either by the occlusion of the teeth (vertical dimension of occlusion VDO) or the balanced tonic contraction of the opening and closing muscles of mandibular movements (vertical dimension of physiologic rest position VDR).

These two measurable lengths of the face are important guides in making maxillo-mandibular relation records and are referred to as:

- Vertical dimension of rest (VDR)
- Vertical dimension of occlusion (VDO)



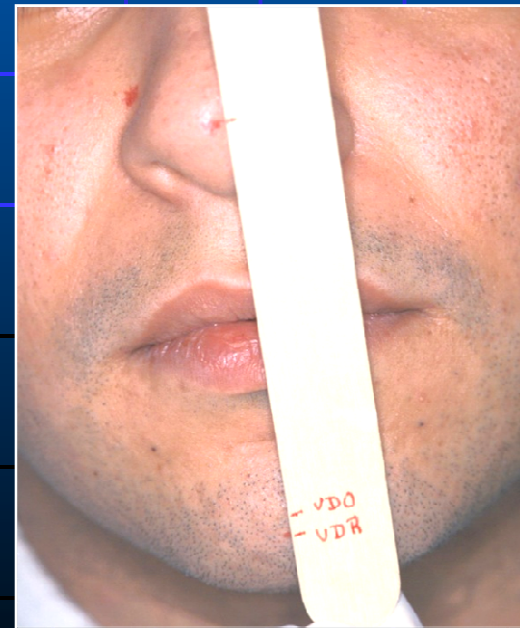
VDO (rest)



VDR (occlusion)

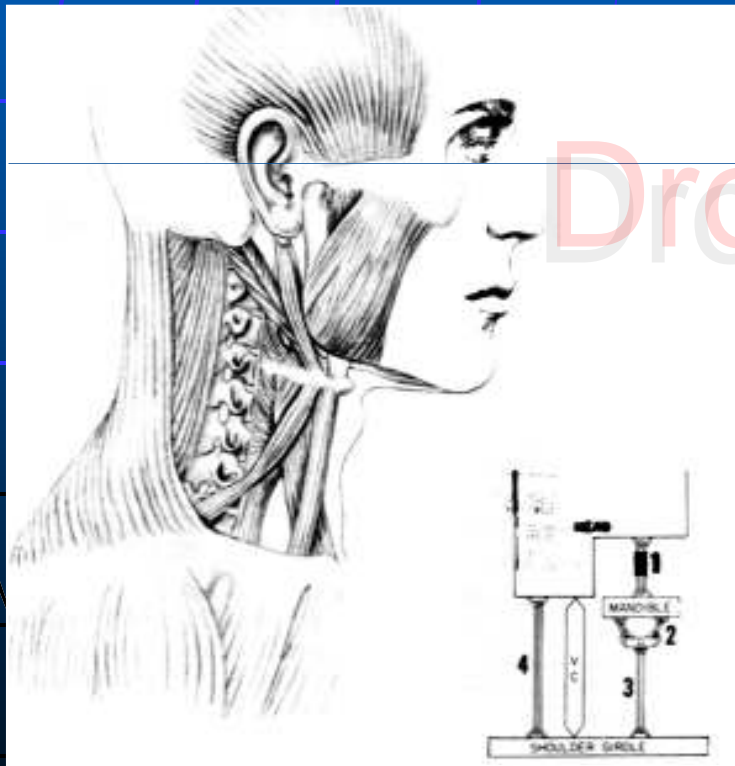
“Free-way space” or Interocclusal Rest Space:
Is the difference between the vertical dimension of rest and the vertical dimension of occlusion.

VDR minus VDO = Free-way space (range 2-4 mm)

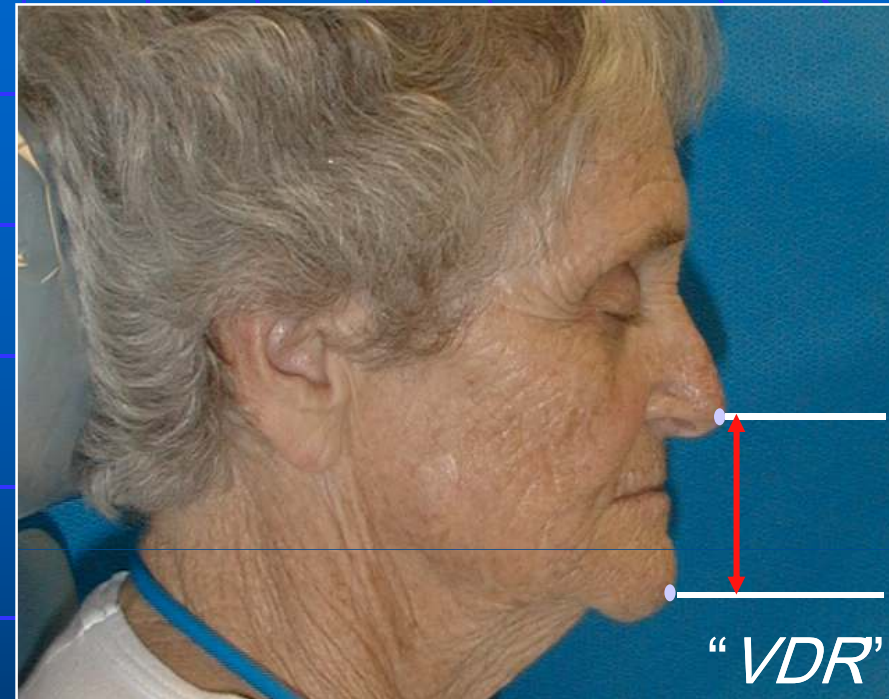
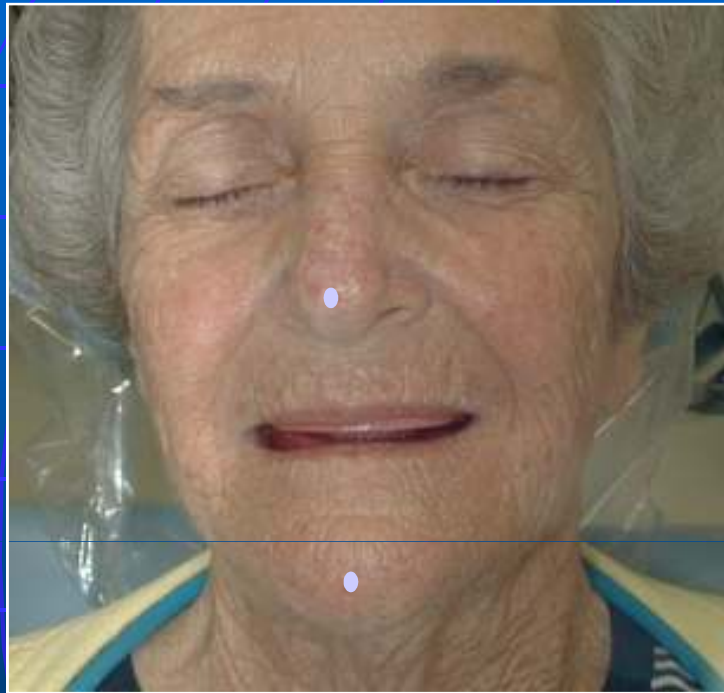


Vertical Dimension of Rest (VDR)

Definition: Is the vertical separation of the jaws when the opening & closing muscles of the mandible are at rest in tonic contraction. It is the length of the face when the mandible is in physiologic rest position.



- In the absence of pathosis the relation is fairly constant throughout life.
- The position can be accurately recorded and measured within acceptable limits.
- It is used as an aid in the determination of the vertical dimension of occlusion.



Establishing Vertical Dimension

- **Place the patient in an upright position**
- **Place marks on the tip of nose and the tip of the chin, on the greatest height of curvature.**
- **Make sure the chin is unstrained**

VERTICAL DIMENSION

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1. Facial Measurements

- patient sits comfortably, looking straight ahead
- insert maxillary record base
- place point of reference on nose & chin
- instruct patient to lick lips and swallow
- mandible comes to rest position
- measure the distance between reference points

2. Tactile Sense- where patient feels most comfortable

3. Phonetics- Repeat the letter “mm-mm” and relax

4. Facial Expression- recognize the patient’s relaxed facial expression when the jaws are at rest

5. Anatomic landmarks- average measurements, questionable validity



*No one method for determining rest position can be accepted as being valid for all patient's; therefore, it is advisable to use several methods and compare the results

VERTICAL DIMENSION

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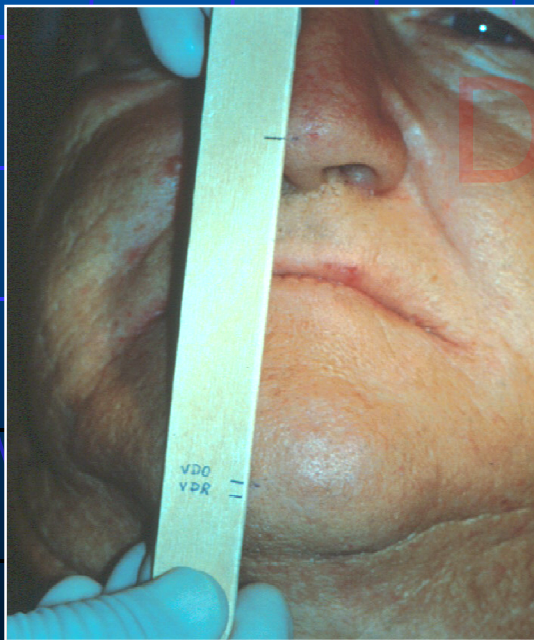
- Soften mandibular wax rim with hot spatula



- Temper in water bath

METHOD OF OBTAINING VDO

- Insert mandibular record base
- Have patient bite down on the softened wax rim

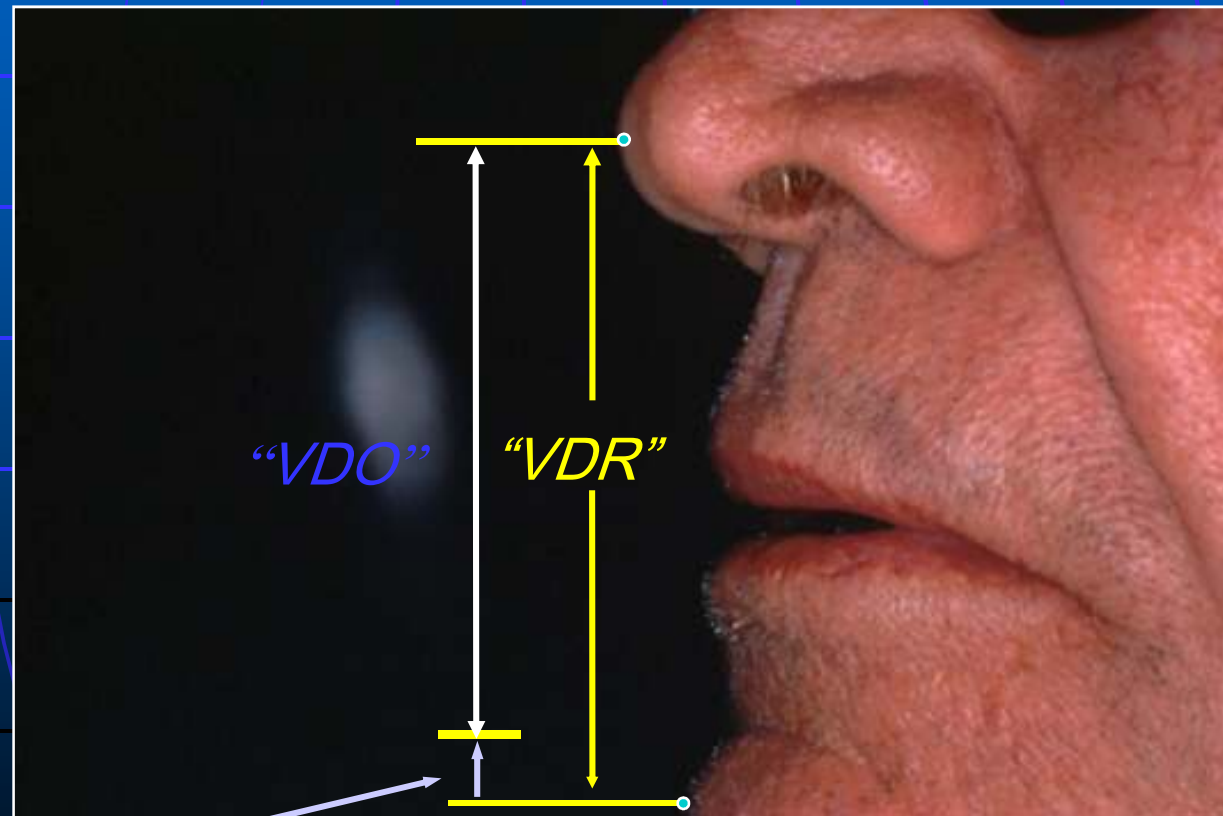


- Repeat until patient is at previously determined VDO position.

$$*VDR-(2-4mm)=VDO$$

INTEROCCLUSAL REST SPACE : FREEWAY SPACE

The distance between the occluding surfaces of the maxillary and mandibular teeth when the mandible is in its physiologic rest position



Interocclusal Rest Space

INADEQUATE INTEROCCLUSAL REST SPACE RESULTS IN;

- clicking of the teeth
- facial distortion, tense strained appearance
- difficulty closing lips
- difficulty swallowing
- soreness and discomfort under the denture
- increased ridge resorption due to trauma



Inadequate Interocclusal Rest Space = Excessive VDO

EXCESSIVE INTEROCCLUSAL REST SPACE RESULTS IN;

- reduced interarch distance when the teeth are in occlusion
- overclosure is potentially damaging to the TMJ
- normal tongue space is limited
- facial distortion, chin is closer to nose, commissure of the lips turns down , lips loose their fullness
- muscles of facial expression loose their tonicity,
- face appears flabby
- angular cheilitis is sometimes attributed to overclosure



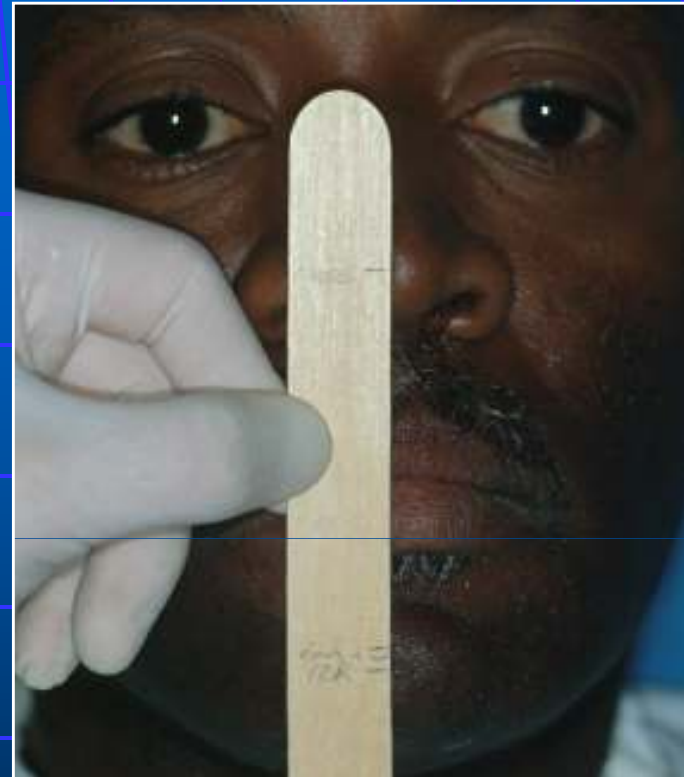
Excessive Interocclusal Rest Space= Inadequate VDO

CLOSEST SPEAKING SPACE



- "s" sounds
- count from 60-70

- Measures vertical dimension when the mandible and muscles involved are in physiologic function of speech.
- The final test that we use to determine if the vertical dimension of occlusion that we have chosen is correct.
- Measure VDO of existing denture and compare.



- Now that we have determined the vertical occlusion how do we record the position of the mandible so that we can mount the mandibular cast on the articulator?

Centric Occlusion(CO):

Definition: is the relation of opposing occlusal surfaces that provide maximum intercuspation.

Centric Relation(CR):

Definition: a maxillomandibular relationship in which the condyles articulate with the thinnest avascular portion of their respective discs with the complex in the anterior-superior position against the slopes of the articular eminences.

Centric occlusion with teeth present is a tooth-to-tooth relation, whereas centric relation, is a static position, is a bone to bone relation.

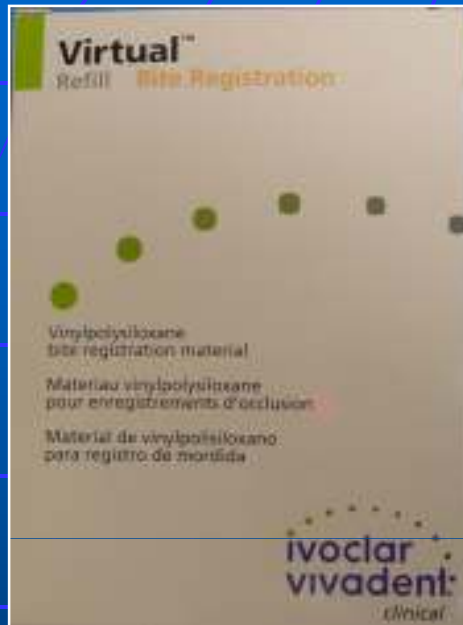
CENTRIC RECORDS

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ISO Compound



1. Functional (Chew in)
 2. Graphic (Intraoral or extraoral tracings)
 3. Physiologic (Interocclusal records)
 - a. Waxes (i.e Alu-wax)
 - b. Impression Compounds (ISO compound)
 - c. ZOE paste
- waxes are capable of making a record upon contact and the jaws can be separated at once.
 - compound and ZOE must be maintained in contact until the material is hard
 - waxes are easily distorted and unless extreme care is exercised when the records are positioned, an error can occur
 - compound & ZOE will break before they will distort



Material Properties

- Virtual is an addition-reaction silicone
- Thixotropic viscocity
- Fast setting time
- Dimensionally stable
- Final hardness (95 Shore-A)

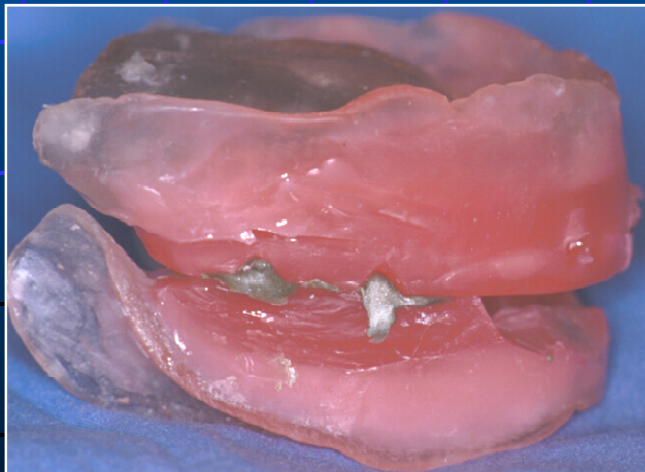
Application

- Inject material on occlusal surfaces
- Guide patient into a CR position
- Hold the position until material is set (60 sec.)



The technique can be divided into 2 steps:

1. A tentative record using wax occlusion rims attached to accurate stable record bases.
2. Interocclusal check records with teeth arranged during the final try-in.



Alu-wax



CENTRIC RELATION RECORD

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1. CR is a reference point in recording maxillomandibular relations. It is independent of tooth contact. It allows us to record the anterior-posterior position of the mandible.
2. It can be verified and repeated
3. It is a starting point for developing occlusion. For denture occlusion $CR=CO$.
4. It's a functional position, although fleeting in nature.

*** CR should be recorded at the proper VDO

The primary requirements for making a CR record:

1. Record the horizontal relation of the mandible to the maxilla at the proper VDO.
2. Exert equal vertical pressure on the record base while making the record.
3. Avoid distortion of the record until the casts have been accurately mounted.
4. A record that cannot be repeated or verified is not acceptable.



RECORDING CENTRIC RELATION

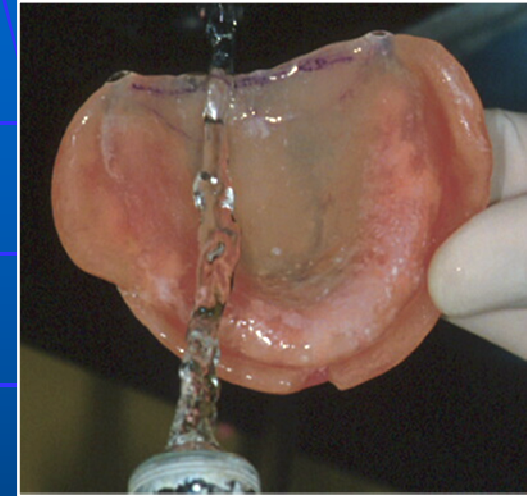
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- Before making the final record check for interferences between the record bases

- Adjust record bases as necessary





Denture Adhesive

- If retention is lacking sprinkle a thin layer of powder adhesive onto the record base
- Tap off excess powder
- Wet the surface

CENTRIC RELATION RECORD

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- Have patient practice closing gently in a retruded position before making the final record



Making CR records consists of two phases:

1. Getting the entire mandible retruded
-Bimanual technique
2. Positioning the condyle-disc assembly
in the uppermost anterior position.

CENTRIC RELATION RECORD

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Mounting the mandibular cast:



Note: The casts and mountings are smoothed and sanded as shown

SETTING THE CONDYLAR INCLINATION



- Loosen the centric locking pins on the Stratos 200 articulator
- Observe the space that develops between the condylar elements when the casts are completely seated in the protrusive record

PROTRUSIVE RECORD

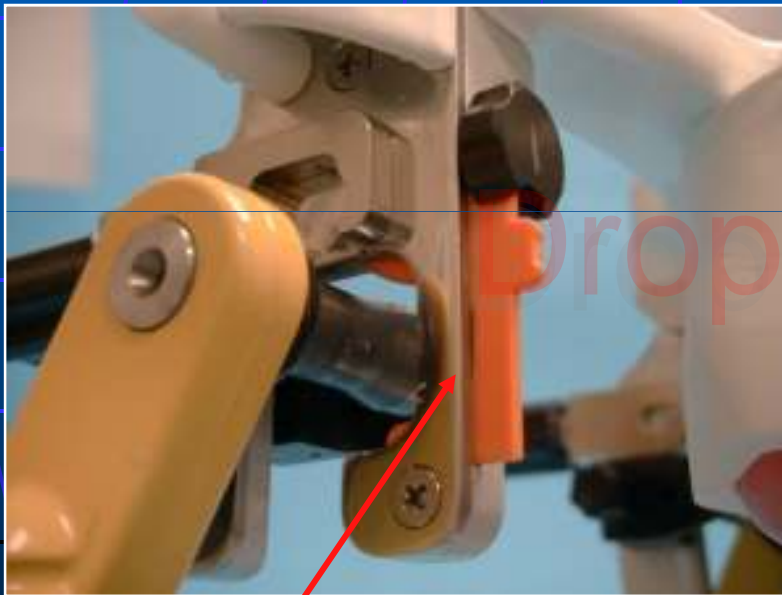
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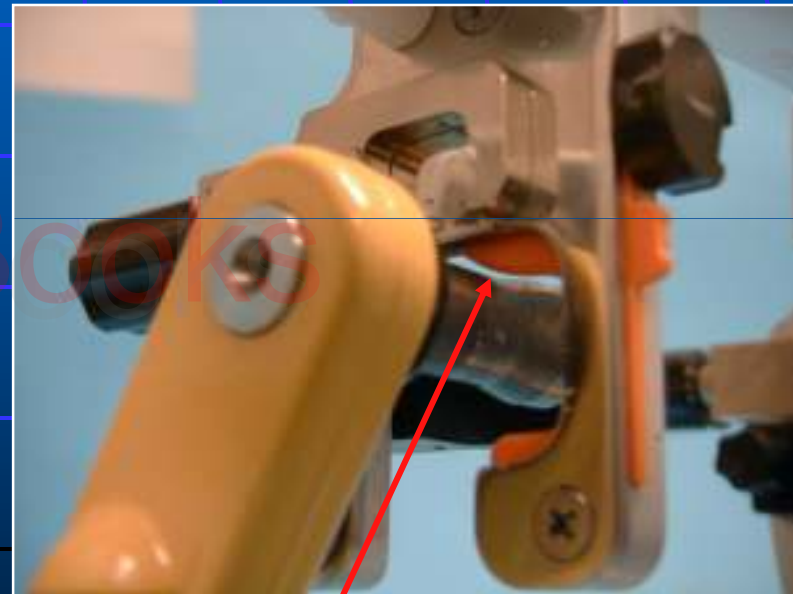
- The movement the mandible and condyle is downward and forward. The angle of the slide varies from patient to patient and from side to side.
- We will use this record to set condylar inclinations so that the articulator can perform eccentric movements equivalent to the relative movements of the mandible to the maxillae. This makes it possible to arrange the teeth for complete dentures in balanced occlusion.
- The mandible must be protruded a minimum of 5-6 mm when making the record.

SETTING THE CONDYLAR INCLINATION

- Select a protrusive insert that best fits the space
- Place the protrusive insert into position



Orange 20° protrusive insert

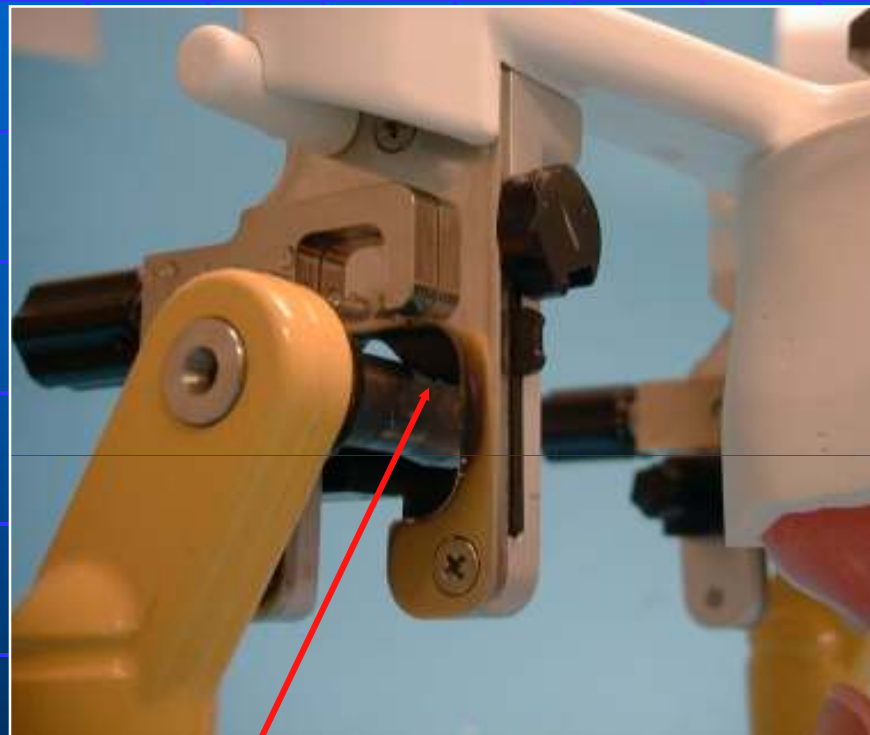


Note space remaining

SETTING THE CONDYLAR INCLINATION



Black 30° protrusive insert



Fits perfectly into position & completely fills the space

Maxillomandibular records summary

1. Seat pt. comfortably with head upright.
2. Contour and mark the maxillary wax occlusion rim (lip contour, midline, occlusal plane).
3. Make a facebow transfer record and mount the maxillary cast.
4. Establish (a) VDR & (b) VDO
5. Make a tentative CR record at the proper VDO
6. Use CR record to mount the mandibular cast on the articulator.
7. Make a Protrusive record to set condylar inclinations.

Centric Tray Technique



CENTRIC TRAY

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- The Centric Tray may be used to record a preliminary occlusal relationship. This can be quickly accomplished during the impressions appointment.
- This record permits the laboratory technician to mount the master casts prior to fabricating record bases and wax rims.
- The record can be verified at the following appointment with the record bases.



CENTRIC TRAY

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Clinical Application:

- Determine the patients VDR and VDO
- Load the tray with heavy body Virtual and place in patients mouth.
- Chin guide the patient into Centric Relation
- Have the patient close to the previously determine vertical dimension of rest.
- Allow the material to set and remove from the mouth.

CENTRIC TRAY

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The Centric Tray handle is compatible with the registration assembly of the Transferbow. This allows the clinician the option to also obtain a face bow record at the same time.



CENTRIC TRAY

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Position the upper components of the Transferbow on the patient



Insert the Centric Tray record and have the patient close back into the registration



CENTRIC TRAY

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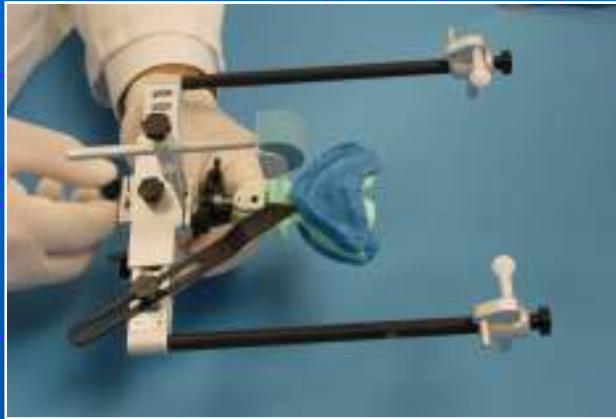
- The Centric Tray is attached to the Transferbow and secured in place



- Once the alignment of the transferbow is verified and all the set screws are secured the apparatus is removed and ready for mounting.

CENTRIC TRAY

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- The Centric Tray is removed from the Transferbow and placed on the Stratos articulator.
- Set the models in the silicone impression and check the fit. Trim back the vestibular edges of the silicone as necessary.
- Mount the models on the articulator, positioning them in relation to the occlusal record.

CENTRIC TRAY

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Prior to seating the casts into the Centric Tray
Record the registration is trimmed back to
reduce any possible interferences



Mounted casts using the Centric Tray Registration

